95-17

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Spencer Heaters

THE SPENCER HEATER CO.

Scranton, Pa.

CATALOGUE No. 7.

(C. 1900's)


THE
TIMES PRINTERY
SCRANTON, PENNA.

Preface

This book is published for those interested in steam or hot water heat, for the purpose of showing them a modern device which burns the cheaper variety of coal with the minimum amount of attention. Thus being of enormous advantage both in saving of money and labor.

The Boiler

The chief function of a boiler is to absorb the heat that has been set free in the fire-pot and transform this heat into an available form of energy.

This is accomplished by the metal of the boiler transmitting to the contained water the heat of combustion and the water absorbing this heat.

The amount of heat so conducted and absorbed will depend on the area and arrangement of the heating surface of the heater.

The efficiency of a heating surface depends on the rapidity of the circulation of the water and the directions of the heated gases which strike the surface.

Experiments have proven that the most efficient position of the heating surface is at right angles to the direction of the heated gases.

Circulation

The circulation of water in a boiler depends on the difference in weight of the water in various parts of the heater, due to the difference in temperature. As heat is applied to the boiler, the parts of water nearest the heating surface are heated, and rise, and colder and heavier parts of water descend to take their place. The rapidity of the change depends on the difference of temperature of the water in various parts of the heater, the greater the difference, the more rapid the change.

Authorities agree that in the principal operation of a heater, two columns are formed, the ascending column

being composed of hot water and steam; the descending column of colder water. But a great difference of temperature involves dangerous strain on the boiler, so that this solution of the problem is to be avoided by making the water line of the boiler of a sufficient height, so that the difference in weight between the ascending, hotter (therefore ligher), and the dscending, colder (therefore heavier), will produc the same effect, and the difference in temperature does not have to be so wide to give the desired circulation.

As the water in the "Spencer" circulates in one direction, there are no interfering currents, and all parts of the boiler are kept at nearly an even temperature, preventing unequal strain; and as the water is divided into many thin, small streams, which pass through the hottest part of the heater, the rapid sweep of the currents tend to stop the liability of depositing sediment, heats the water more quickly, stops the heating surface from being overheated, and gives great life to the tubes.

After careful experiments, the heating surface of the "Spencer" has been constructed the proper size, so as to absorb all the heat set free in the fire-box, thus giving the minimum coal consumption for the maximum amount of heat.

Chimney

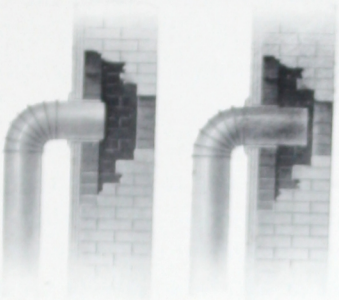
The flue leading from the heater to the chimney should be somewhat larger in area than the chimney itself. Any bends or reductions of area in the flues offer great frictional resistance to the flow of gases, and hence interfere seriously with the draft; therefore, a boiler should be placed as near the chimney as possible. The opening into the chimney should be slightly higher than the opening in heater, giving the connecting flue a slight rise between these two points.

The form and size of chimney is of great importance in connection with the satisfactory operation of a heating plant, and it should in every case receive the closest inspection before any assurances of capacity are made. It will be found that, for a specified area, a round chimney will have the most capacity, but in ordinary buildings, construction of such a chimney is difficult and is seldom found.

A square chimney has somewhat more friction, and one with a rectangular, narrow flue very much more, so that an increase in area should be made if the latter is used.

The chimney should be as smooth as possible on the inside, in order to prevent loss of velocity by friction. If brick, the flue should be plastered; if brick and lined with terra-cotta pipe, care should be taken that the joints are cemented to prevent the air from passing between the inside of brick wall and outside of terra-cotta lining. Where there are two flues in one chimney, they must be separated by a good partition to prevent the air from going from one into the other. For power purposes, the chimney is given the greatest care, as so much depends on it; but in house-heating, where it is just as important, very little attention is given to this matter.

Great care should be taken in placing the flue into the chimney, not to shove it clear through to the other side, as shown in the accompanying illustration. This is sometimes apt to be done, and will check the draft almost entirely. Sometimes complaints are made that the boiler will not operate, although the smoke pipe is carefully fitted into the chimney, which has a good draft and has been in use for many years.



After thoroughly investigating, it is found that the heater has been attached to a chimney that has more than one opening. **It is absolutely essential that all openings into the flue to which the heater is attached, of any kind whatsover, shall be securely closed.**

Then again, the chimney on which the boiler is connected may be lower than the main part of the house, and the wind blowing over the roof, strikes the top of the chimney and drives the smoke down. The only remedy in this case is to build the chimney up, as is shown in the accompanying illustration. This can be done with a galvanized iron stack, or by simply continuing the brick.

Care should also be taken to see that the chimney is not clogged up in any way by mortar or brick. A good way of cleaning this out is by attaching a large stone or

heavy weight of any kind to a rope, and letting it down the chimney, rubbing it against all sides.

In placing a cap stone, or a galvanized top, or any ornamentation on the top of the chimney, care should be taken that the area of the chimney is not cut down in any way. This will check the draft, which otherwise might be sufficient.

We cannot lay too much stress on the necessity of a good chimney in conjunction with our heater; as it is absolutely essential, in burning the fine size of anthracite or semi-anthracite coal, to have a good draft, since the particles of coal lie so closely together.

The area of cross sections for a chimney will depend upon its height, and upon the amount of coal to be burned, or rather size of boiler. The following table, by R. C. Carpenter has been found to give good results.

Diameter of Chimney in Inches Required for Varying Amounts of Direct Radiation.

It is necessary that area and HEIGHT, thickness of walls, general structure, and the position of the top outlet with reference to the building and other buildings near by should be carefully noted and observed in the selecting or building a flue.

The figures given under the varying heights of chimneys are diameter measurements in inches, or, the side of a square—the theory being that the spiral ascending column of smoke and gases will make a twelve by twelve inch flue no more extensive in practical working area than a twelve inch round flue. Rectangular shapes may be used if the area is equal and the difference in width and length are not extreme.

Direct Radiation		Height of Chimney Flue					
Steam in Square Feet	Water in Square Feet	20 ft.	30 ft.	40 ft.	50 ft.	60 ft.	80 ft.
250	375	7.4	7.	6.7	6.4	6.2	6.
500	750	9.6	9.2	8.8	8.2	8.	6.6
750	1150	11.3	10.8	10.2	9.6	9.3	8.8
1000	1500	12.8	12.	11.4	10.8	10.5	10.
1500	2250	15.2	14.4	13.4	12.8	12.4	11.5
2000	3000	17.2	16.3	15.2	14.5	14.	13.2
3000	4500	20.6	18.5	18.2	17.2	16.6	15.8
4000	6000	23.6	22.2	20.8	19.6	19.	17.8
5000	7500	26.	24.6	23.	21.6	21.	19.4
6000	9000	28.4	26.8	25.	23.4	22.8	21.2
7000	10500	30.4	28.8	27.	25.5	24.4	23.
8000	12000	32.4	30.6	28.6	26.8	26.	24.2
9000	13500	34.	32.4	30.4	28.4	27.4	25.6
10000	15000	37.	34.	32.	30.	28.6	27.

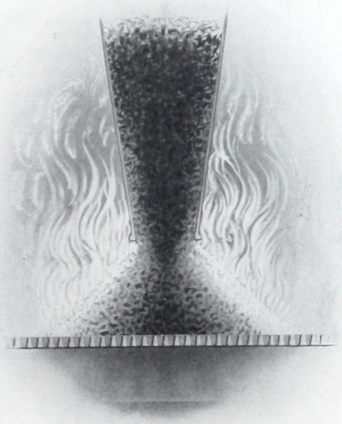
* NOTE—When a considerable amount of INDIRECT radiation is to be used increased Boiler capacity is necessary and in many cases such demands require a larger chimney flue for same number of square feet of radiation used.

The Magazine Feed

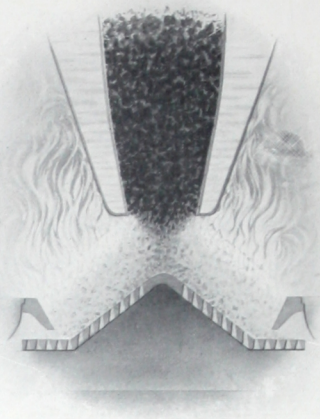
The construction of the magazine on the "Spencer" has overcome the objections to the ordinary one by water-jacketing. By this, we mean that a body of water lies between the surface that is exposed to the heat, and the surface which holds the coal. This water is part of the heater's water supply. If the boiler is carrying a steam pressure of 5 pounds, the temperature of this water will be only 227 degrees Fahr.; therefore, the magazine which is next to the coal cannot be warmer than the water which surrounds it, while the heat in the combustion chamber is about 977 degrees Fahr.

As it takes about this number of degrees Fahr. to ignite coal, and as the coal in the magazine cannot possibly get warmer than the water in the heater, one can easily see that the coal coming into the fire-pot is absolutely intact, not even having the gases distilled off of it.

The ordinary magazine, as found on the market today, has no



The Ordinary Magazine



The Spencer Magazine

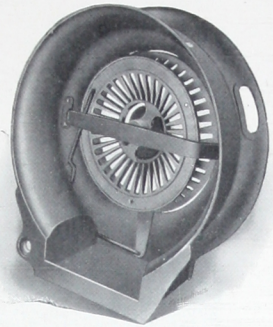
water-jacket. The surface that holds the coal comes in direct contact with the fire; the coal becomes very hot, and either burns or the gas is distilled off before it is discharged on the fire. The ordinary magazine-fed boiler will have a magazine burn out in a few years, but the "Spencer," on the contrary, cannot be destroyed, owing to the fact of its water-jacketing.

The magazine holds coal enough to last from twelve to twenty-four hours, according to the weather. It feeds down from the centre, at the rate of consumption, keeping a bright fire over the grate, which insures a warm, unchanging temperature in the building, day and night, during the coldest weather. When it becomes necessary to put coal into the magazine, the fire is not disturbed, and the heating goes on just the same.

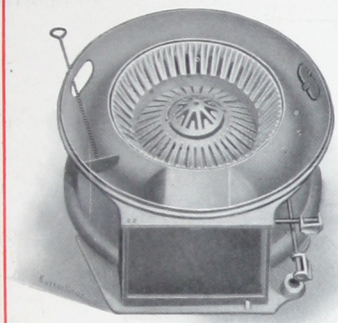
On the contrary, in the surface-feed boiler, when it becomes necessary to renew the fire, you throw the coal on, the steam immediately goes down, and no pressure can be had until the fire gets through to the surface of the fresh coal again.

Vertical Grates

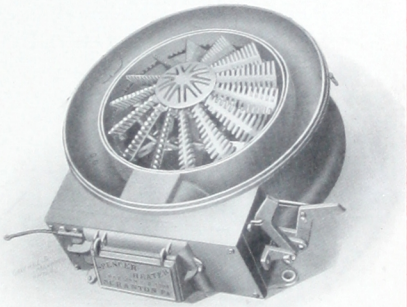
The grates are peculiarly constructed to suit the magazine-feed boiler. They are raised in the center and have the same pitch at which the coal comes off from the magazine. This insures an even thickness of coal over the grate, causing the fire to burn evenly and the coal to slide from the magazine as it is consumed.



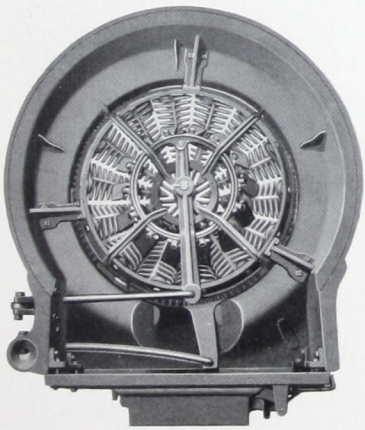
No. 1 and 2 Grates



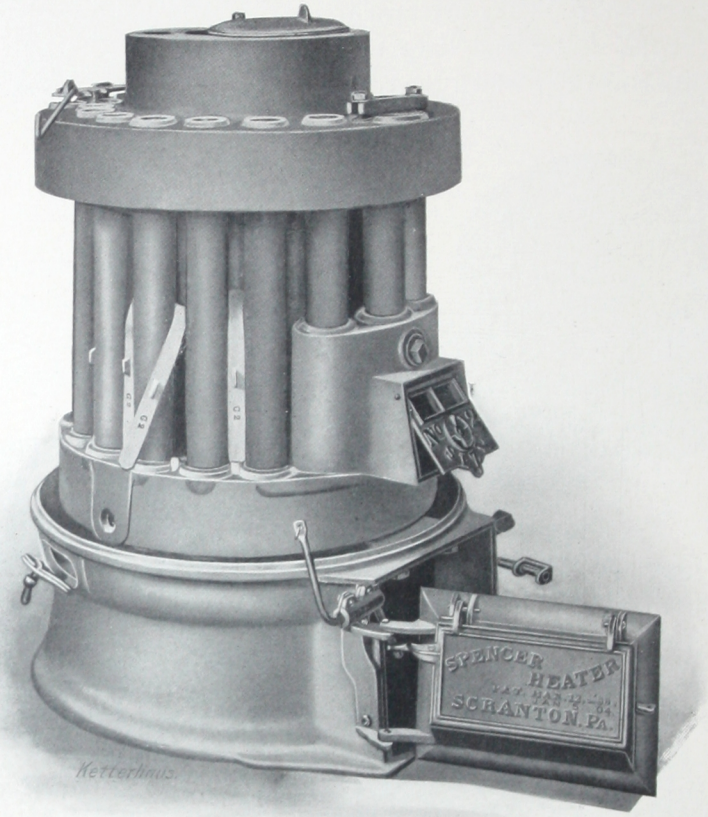
No. 1 and 2 Grates



No. 3 and 4 Grates

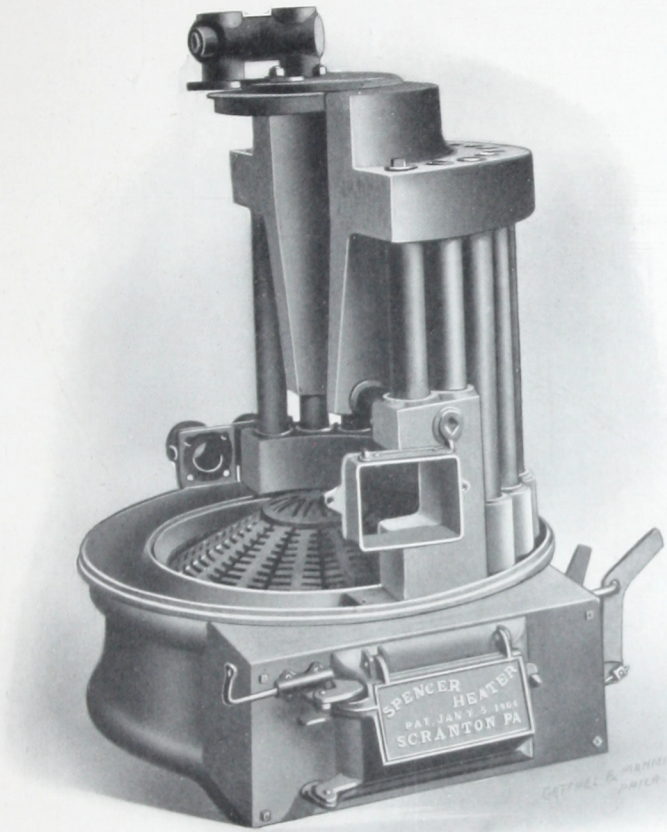


The grates for the No. 1 and No. 2 are the rotary sliding type. The grates for the No. 3 and No. 4 are the rocking type.



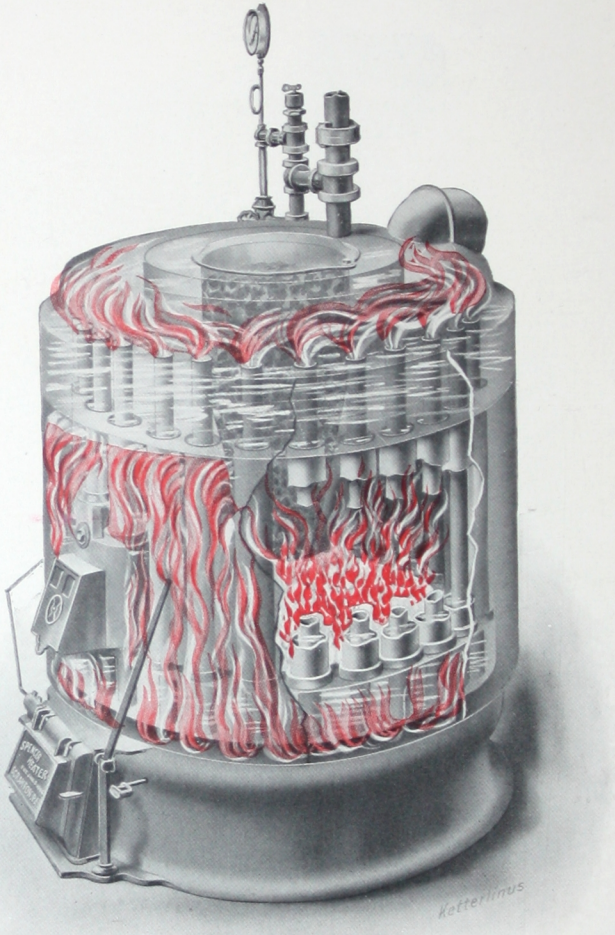
No. 1-2 Heater, Dismantled

For Dimensions See Page 38



No. 3-4 Heater, Sectional

For Dimensions See Page 38



Vertical Heater, Showing Combustion Travel

Combustion Travel (Vertical)

In the vertical heater the gases rise from the fire-pot about the water tubes, then pass among the tubes, striking them at right angles, over the top of the baffle plates, descend to the bottom of the heater, then through the flues to the smoke-box and out to the chimney. From this it can be seen that the gases travel three times the length of the heater.

Cleaning--- Vertical Heater

This boiler can be cleaned by removing the smoke-ring from the top of the heater, and running the brush provided for this purpose through the flues, then removing the soot doors at the bottom of the heater and scraping the soot out with the scraper, as shown in the cut of the grates on page 11.

Heating Surface

The thick cast-iron necessarily used in cast-iron boilers hinders the tranmission of heat to the water.

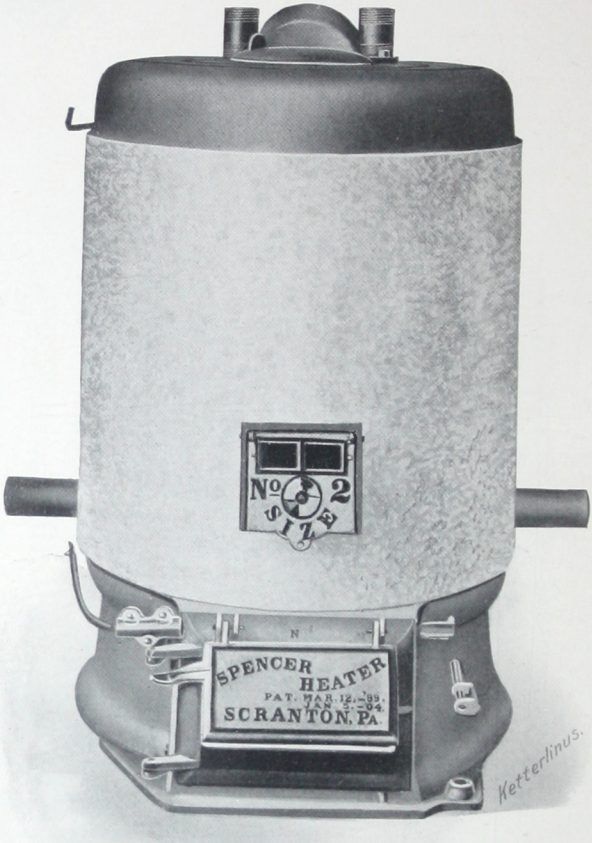
Water tubes, however, admit of thin envelopes for the water next the fire; the water, being divided into many small streams, passes through the hottest part of the fire-pot. Steam may thus be rapidly raised, and sudden demands upon the boiler quickly met.

Automatic Regulations

Our steam heater is equipped with an automatic regulator which will keep an even pressure for from twelve to twenty-four hours, or in other words, just as long as the magazine is filled with coal. Our hot water heaters are not equipped with automatic regulators unless so specified by the purchaser, and an extra charge is made for the same.

No. 1-2 Steam Heater

No. 1-2 Steam Heater, Back View



No. 1-2 Hot Water Heater.

Direct Draft

Nos. 1 to 5 have a direct draft arrangement, which turns the gases directly from the fire-pot into the chimney, when open, causing the fire to burn more rapidly and arriving at a higher temperature more quickly than when the gases are sent through the flues, and thus to the chimney.

This is done in sudden changes of the weather, when it is necessary to get fire up quickly, and as soon as this is accomplished, should be closed so as to get all of the energy out of the heated gases.

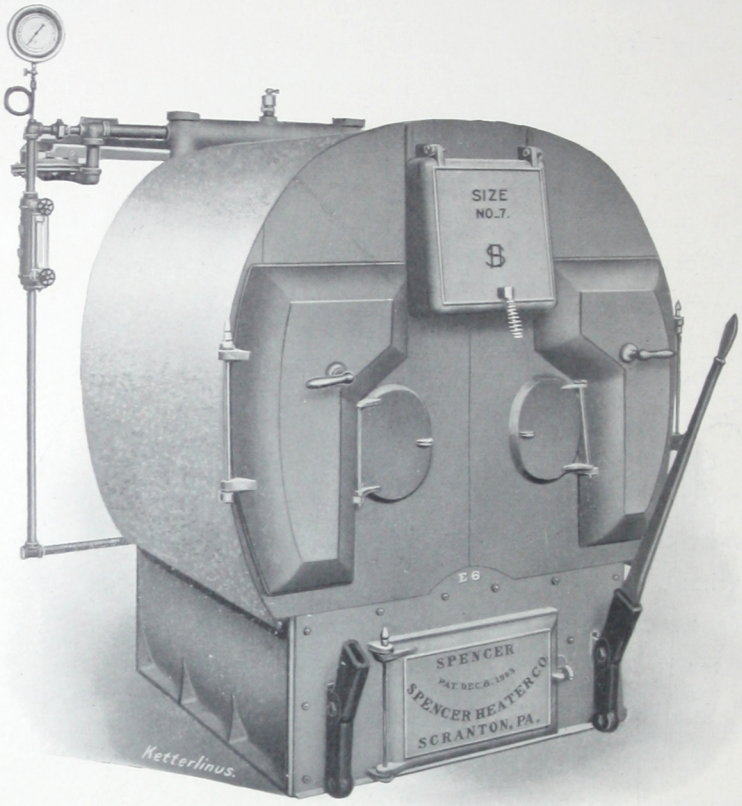
Tube and Flue Construction

These boilers have large steam drums at the top, which are connected to the heating surface by headers. To the inside of these headers are expanded the water tubes, which have the water on the inside and fire without. The fire tubes are expanded to the outside of the headers and pass through the water tubes. On these, the water is outside and the heat passes through.

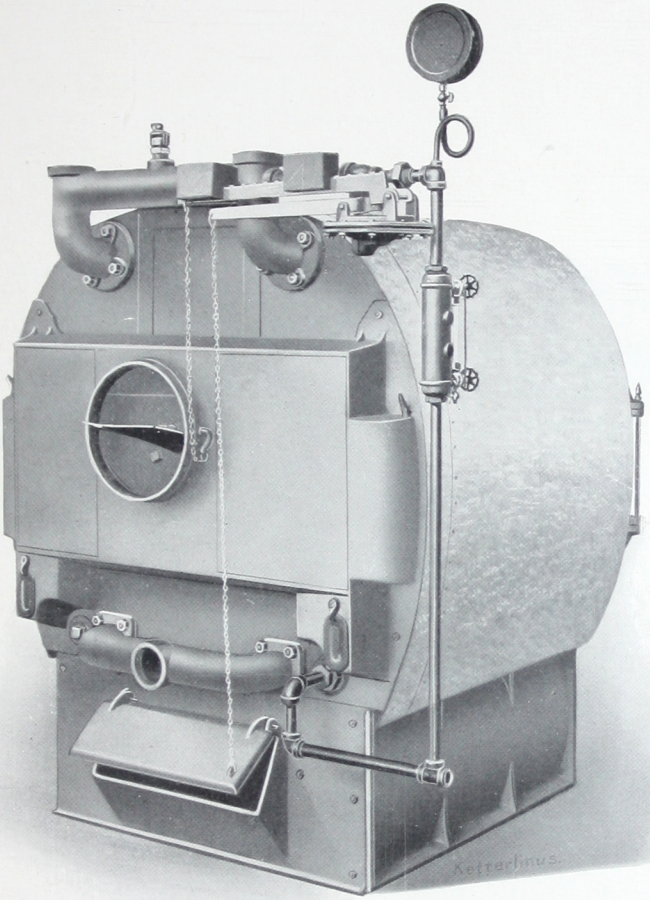
(See pages 14 and 22.)

As these two features show, the boilers are a combination of water and fire tube.

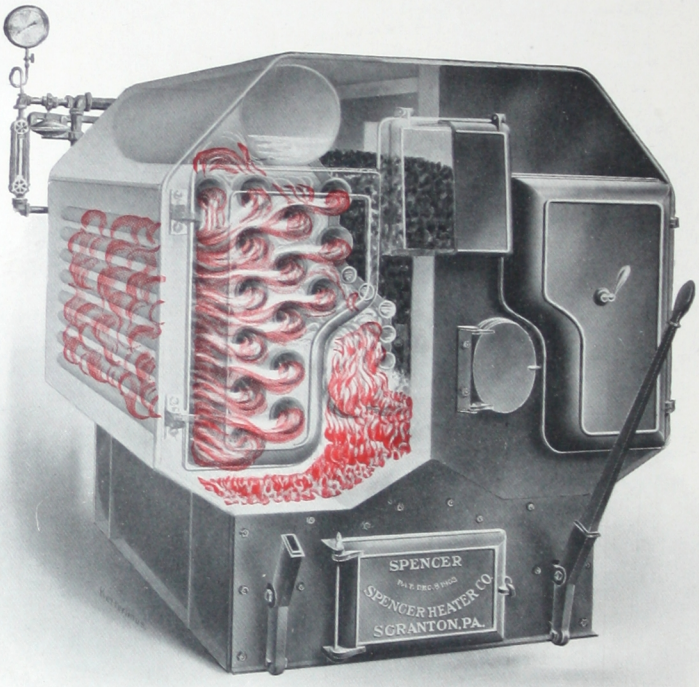
This is the fastest steaming device known in modern boiler construction, and combines the fine qualities of the water-tube boiler and the return tubular, both of which are admitted to be most satisfactory for high pressure work where every ounce of utility must be gotten out of the coal and boiler in making steam.



No. 8-14 Steam Heater, Front View.



No. 8-14 Steam Heater, Rear Connections



Horizontal Combustion Travel

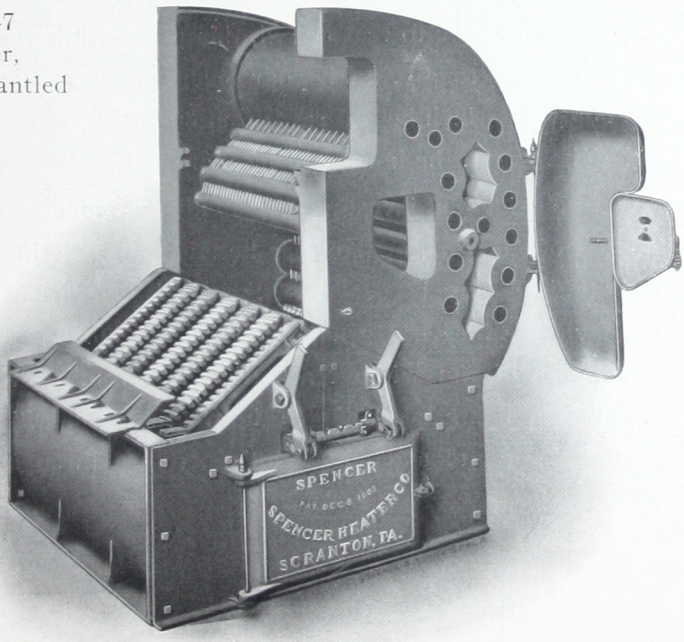
Combustion Travel
(Horizontal)

The currents of gases, after leaving the fire-pot, are broken up by passing between the staggered water tubes, and completing their combustion among these tubes and about the steam dome. Here again the "Spencer" surpasses the ordinary cast-iron heater by having a number of tubes pass through this intense heat, thus splitting the water up in small, thin streams, where, in the ordinary heater, this is one large body of water held over the fire by the crown sheet.

After passing among the water-tubes, the currents go to the front of the boiler, are turned by the flue covers and go through the smoke flues, where the remainder of the heat is absorbed, thence to the chimney.

One can readily see from this that every possible particle of heat is absorbed from the gases before they leave the heater.

No. 5-7
Heater,
Dismantled



Investment Idea of The "Spencer"

The "Spencer" burns the cheaper sizes of anthracite or semi-anthracite coal, which will effect a saving, when used in conjunction with our boiler, of from 30 to 50 per cent. on your fuel account, as compared with the consumption of coal by the ordinary cast-iron heater.

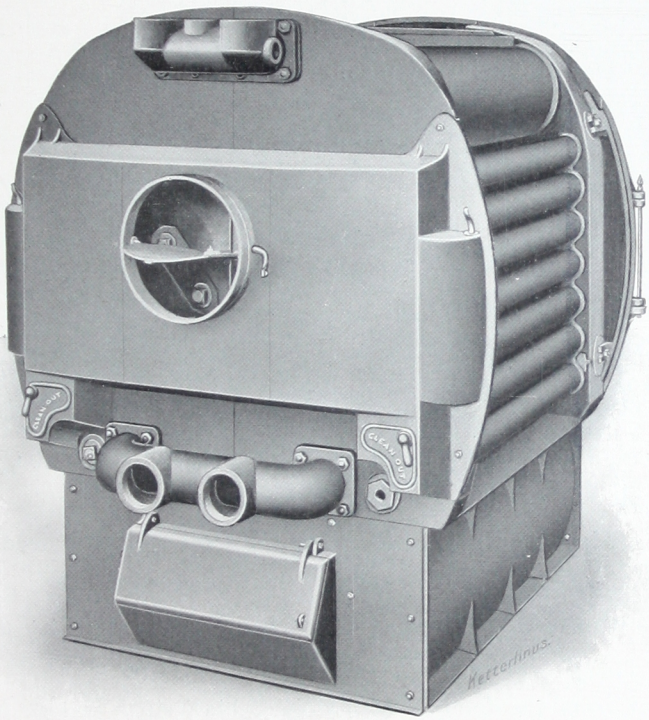
In selecting a heater for your home, one cannot overlook this large saving. However, should you wish a heater to place in a house to rent or sell, this proposition presents itself just as strongly, for if your tenant has something in the house on which he can save from 30 to 50 per cent. on his fuel account, the house can be more easily disposed of.

In making an investment, one always considers the amount of worry and annoyance he must undergo in order to get his money back. The "Spencer" places this at a minimum. With its magazine feed and its automatic regulation, it will run without attention for from twelve to twenty-four hours, according to the weather, and will keep a steady pressure and an even temperature through this period.

Coal Used

The "Spencer" is designed to burn the fine size of anthracite coal, such as Pea and Buckwheat No. 1, or the fine size of semi-anthracite coal.

Great care should be taken in buying fuel, that the very best of its kind is procured, in order that satisfaction may be obtained.



No. 8-14 Hot Water Heater, Without Jackets

Cleaning Horizontal Heater

The boiler can be cleaned in its vital parts easily and quickly. The smoke flues are cleaned by opening the flue cover doors and running a brush provided for this purpose through them. The soot is thus shoved to the back smoke-box, where it can be taken out by removing the two small soot doors. The water tubes are cleaned outside by means of a scraper.

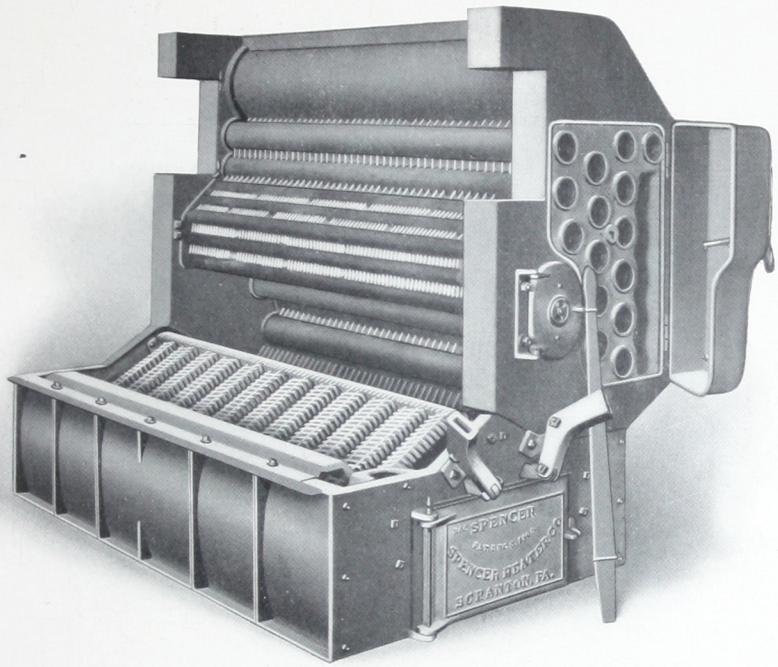
Height

In constructing these boilers, especial attention has been given to the height. They are made as low as is consistent with the vital requisites, proper depth of ash-pit and fire-pot, and generous spaces for combustion and flue travel.

Jackets

The jackets on the boilers from Nos. 1 to 14 are double, making a dead air space between them, the outside one being made of galvanized iron, the inside one of black iron.

Very good results have been obtained by this dead air space insulation. However, in the largest sizes, experience has proved that asbestos gives better results than the dead air space. And it is for this reason that Nos. 14 to 22 are sent from the factory with only a black iron jacket, over which it is necessary for the contractor to place either asbestos in some form, or an air cell covering.

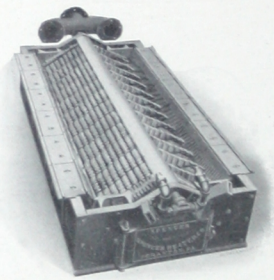


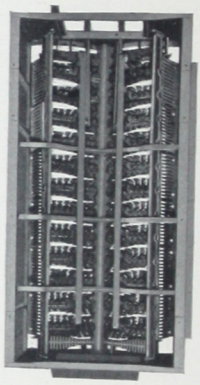
No. 15-21, One Section Removed, Showing
Tube and Flue Construction.

Grates (Horizontal)

These grates carry out the same idea as the vertical heater, and are raised in the center and take the same pitch as that at which the coal comes off from the magazine. They, too, hold a uniform thickness of fire over the grates, causing the coal to burn evenly, and to slide from the magazine as it is consumed.

These grates are so constructed that the coal is not allowed to be shaken through at the apex, but shakes



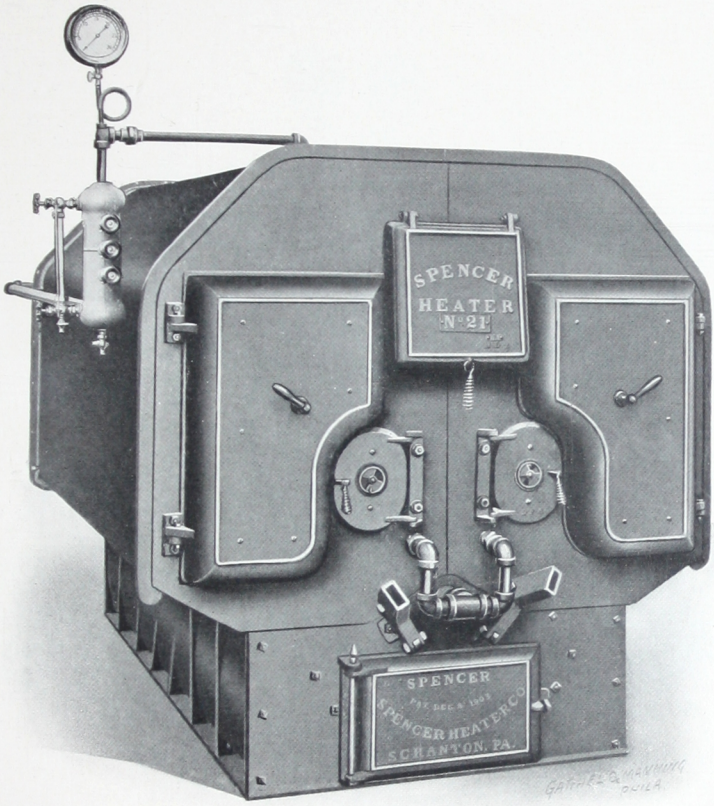


No. 15 and 21 Grates

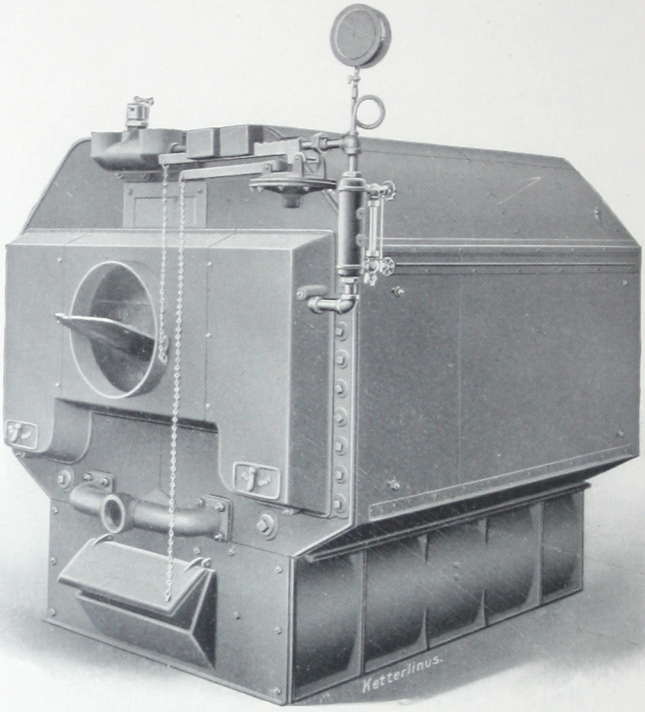
NOTE—Other horizontal grates are the same with exception of water leg.

through very rapidly at the base of the grates. When the coal reaches this place in the fire-pot, all the life has been burned out of it, and thus it should be gotten rid of.

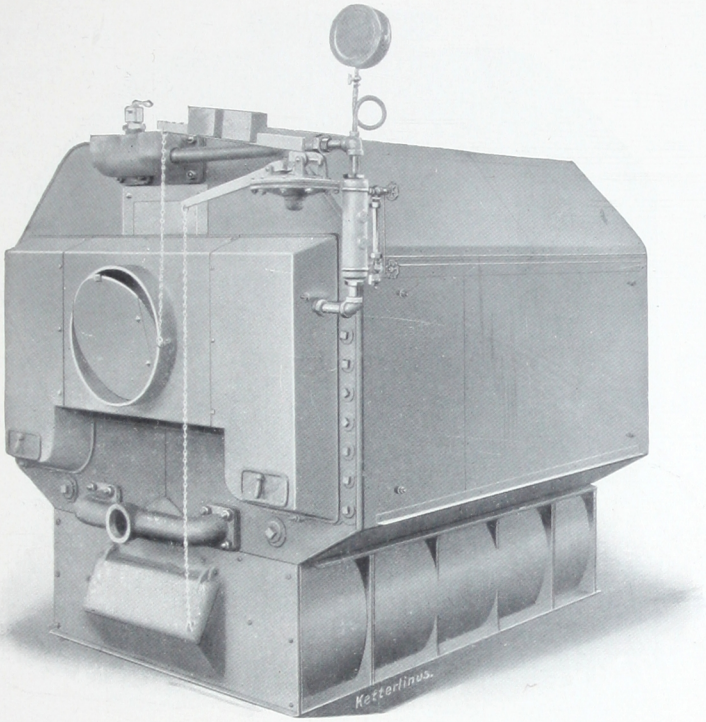
Each side of the heater is shaken separately by means of a lever, which mechanism can be understood from the accompanying cuts.



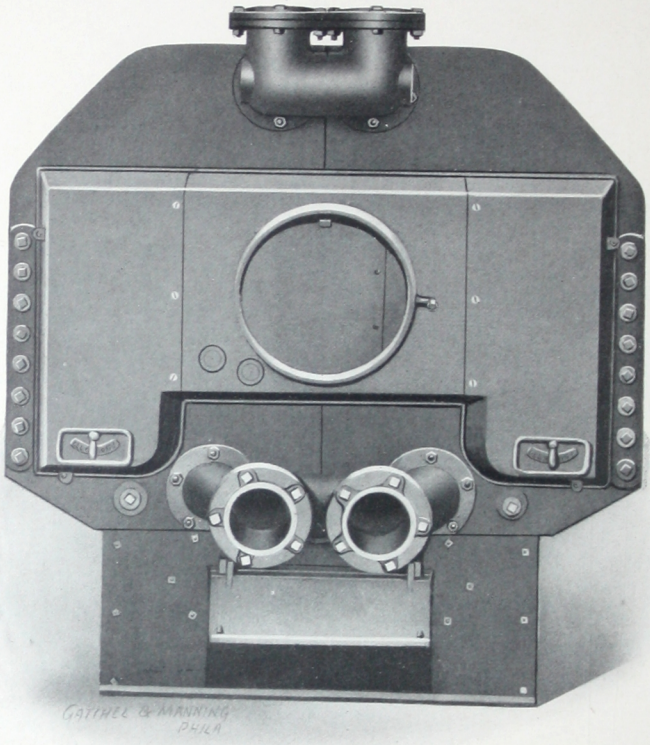
No. 15-21 Steam Heater



No. 15-21 Steam Heater, Back View
Position of Dampers Open



No. 15-21 Steam Heater, Back View
Position of Dampers Closed



No. 15-21 Hot Water Heater, Rear Connections

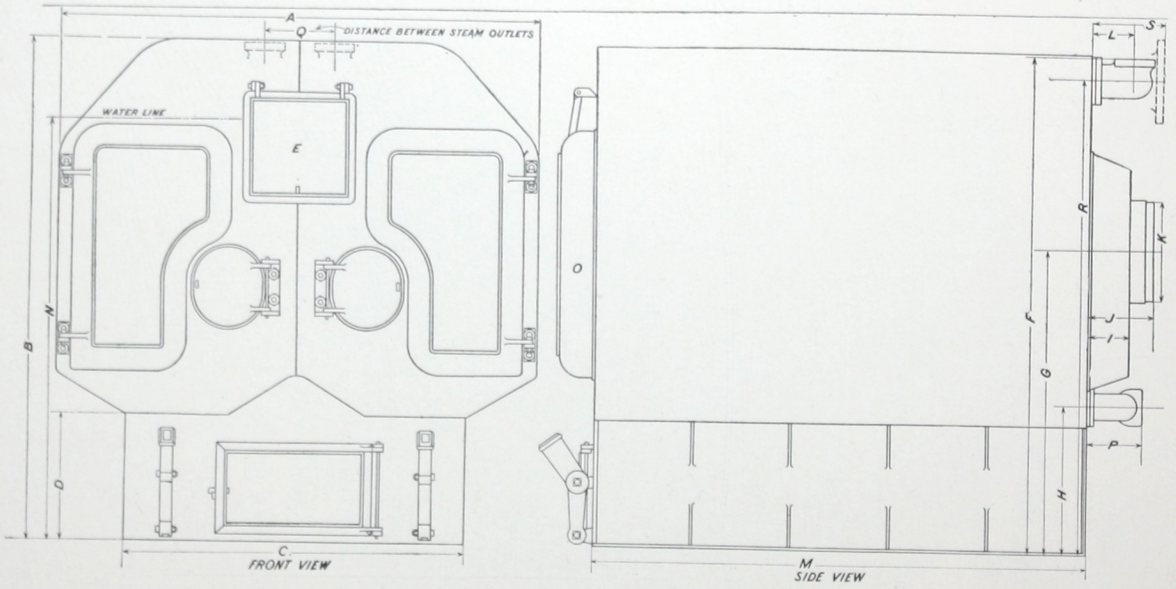
Selecting the Proper Sized Boiler

A false idea of economy is often used in selecting a boiler, considering the first cost instead of what one can save by a little greater initial expenditure, and it is for this reason that sometimes too small a heater is put into a house.

In selecting a boiler, the capacity should always be somewhat greater than the actual requirement, instead of less or equal to it. It not only insures warmth at all times, but gives some reserve capacity to provide against exceptionally cold weather.

Again, by having the boiler of ample capacity, a much slower combustion of fuel is permissible, hence a large saving on your fuel account; and one is also able to regulate the fire in such a manner that no more fuel is used than the amount needed to warm the air to the desired degree of temperature in any room.

In purchasing a heater which is too small to carry on the work, it is necessary to drive it to its utmost capacity in cold weather, and thus cut down the length of life enormously.



Horizontal Heaters

Dimensions for Horizontal Steam and Water Heaters

No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
5	51	55	38½	16	11 x 12	54⅛	37½	19¼	. . .	8¾	11	4⅝	36	44	3½	7¼	8¾	. .	10⅜
6	51	55	38½	16	11 x 12	54⅛	37½	19¼	. . .	8¾	11	4⅝	40	44	3½	7¼	8¾	. .	10⅜
7	51	55	38½	16	11 x 12	54⅛	37½	19¼	. . .	8¾	11	4⅝	45	44	3½	7¼	8¾	. .	10¾
8	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8¾	12½	4⅝	43	51	3½	7¼	8¾	. .	10¾
9	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8¾	12½	4⅝	46	51	3½	7¼	8⅜	. .	10¾
10	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8⅜	12½	4⅝	49	51	3½	7¼	8⅜	57	10⅜
11	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8⅜	12½	4⅝	52	51	3½	7¼	8¾	57	10¾
12	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8¾	12½	4⅝	55	51	3½	7¼	8¾	57	10⅜
13	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8¾	12½	4⅝	58	51	3½	7¼	8¾	57	10⅜
14	52	60¾	38½	16	13¾ x 14	60¼	41	18⅝	. . .	8¾	12½	4⅝	61	51	3½	7¼	8¾	57	10⅜
15	60	63½	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	58	53	4⅞	10⅜	8¾	60½	10¾
16	60	63½	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	61	53	4⅞	10⅜	8⅜	60½	10¾
17	60	63½	42	16	13½ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	64	53	4⅞	10⅜	8¾	60½	10⅜
18	60	63¼	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	67	53	4⅞	10⅜	8¾	60½	10¾
19	60	63½	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	70	53	4⅞	10⅜	8¾	60½	10¾
20	60	63½	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	76	53	4⅞	10⅜	8⅜	60½	10¾
21	60	63½	42	16	13¾ x 14	65⅜	39⅞	19¼	5⅛	8⅛	16¼	6	82	53	4⅞	10⅜	8¾	60½	10¾

Dimensions and Ratings for Vertical Steam Heaters

	1	2	3	4
Number of Heater,				
Ratings for Steam { Buckwheat,	250	350	500	600
Ratings for Steam { Chestnut,	325	450	650	700
Diameter of Grate, Inches,	17½	20½	23	27
Diameter of Base at Foundation Line,	30	33¼	36¼	41
Distance from Center of Boiler to Ash Pit Door,	17½	19	21½	23½
Distance from Center of Boiler to Smoke Collar,	15½	17½	18⅛	21
Height to Top of Steam Outlet,	52⅝	53⅞	57	61½
Height to Top of Steam Trimmings,	60	67	70	73½
Height of Water Line,	40	41	42½	45
Diameter of Smoke Pipe,	8	9	10	11
Height to Center of Return Opening,	12½	12½	15⅓	15½
Tappings for Steam { Outlet,	1–2	1–2½	2–3	2–3
Tappings for Steam { Return,	1–1	1–1½	2–3	2–3
Outside Diameter of Head without Casing,	29½	32	35¾	40¼
Outside Diameter of Head with Casing,	30¼	33¾	36¾	41
Height of Base,	12½	12½	12½	12½
Height to Center of Smoke Pipe,	46½	47½	50½	52½
Shipping weight,	1000	1150	1300	1600

Nos. 3 and 4 are made to come in two sections. See cut page 13.

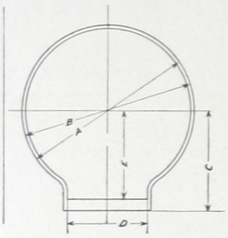
Dimensions and Ratings for Vertical Water Heaters

	1	2	3	4
Number of Heater,				
Ratings for Water { Buckwheat,	400	500	800	1000
Ratings for Water { Chestnut,	500	675	1000	1100
Diameter of Grate, Inches,	17½	20½	23	27
Diameter of Base at Foundation Line,	30	33¼	36¼	41
Distance from Center of Boiler to Ash Pit Door,	17½	19	21½	23½
Distance from Center of Boiler to Smoke Collar,	15½	17½	18⅛	21
Height to Top of Flow,	46⅝	48	57	61
Diameter of Smoke Pipe,	8	9	10	11
Height to Center of Return Opening,	12½	12½	15½	15½
Outside Diameter of Head without Casing,	29½	32	35¾	40¼
Outside Diameter of Head with Casing,	30¼	33¾	36¾	41
Tappings for Water { Flow,	2–2	2–2½	2–3	2–3
Tappings for Water { Return,	2–2	2–2½	2–3	2–3
Height of Base,	12½	12½	12½	12½

Ratings for Horizontal Heaters

No. of Heater	RATINGS				Size of Grate	CONNECTIONS				Weight
	STEAM		WATER			STEAM		WATER		
	Chestnut	Buckwheat	Chestnut	Buckwheat		No. and Size of Outlet	No. and Size of Return	No. and Size of Flow	No. and Size of Return	
5	850	700	1,250	1,100	26 x 26	2–4	2–4	2–4	2–4	1,825
6	1,000	800	1,400	1,250	26 x 30	2–4	2–4	2–4	2–4	1,975
7	1,000	900	1,650	1,400	26 x 35	2–4	2–4	2–4	2–4	2,340
8	1,200	1,000	1,775	1,550	30 x 33	2–4	2–4	2–4	2–4	2,650
9	1,300	1,100	1,900	1,700	30 x 36	2–4	2–4	2–4	2–4	2,800
10	1,450	1,275	2,150	1,950	30 x 39	2–4	2–4	2–4	2–4	2,950
11	1,600	1,425	2,400	2,250	30 x 42	2–4	2–4	2–4	2–4	3,100
12	1,750	1,600	2,650	2,450	30 x 45	2–4	2–4	2–4	2–4	3,250
13	1,900	1,725	2,900	2,650	30 x 48	2–4	2–4	2–4	2–4	3,400
14	2,050	1,850	3,150	2,825	30 x 51	2–4	2–4	2–4	2–4	3,550
15	2,500	2,000	3,800	3,000	36 x 48	2–5	2–5	2–5	2–5	3,700
16	2,750	2,250	4,200	3,400	36 x 51	2–5	2–5	2–5	2–5	3,950
17	3,000	2,500	4,600	3,800	36 x 54	2–5	2–5	2–5	2–5	4,200
18	3,250	2,750	5,000	4,300	36 x 57	2–5	2–5	2–5	2–5	4,500
19	3,500	3,000	5,500	4,800	36 x 60	2–5	2–5	2–5	2–5	4,800
20	4,000	3,500	6,300	5,600	36 x 66	2–5	2–5	2–5	2–5	5,100
21	4,500	4,000	7,000	6,500	36 x 72	2–5	2–5	2–5	2–5	5,400

Foundation for Vertical Heaters

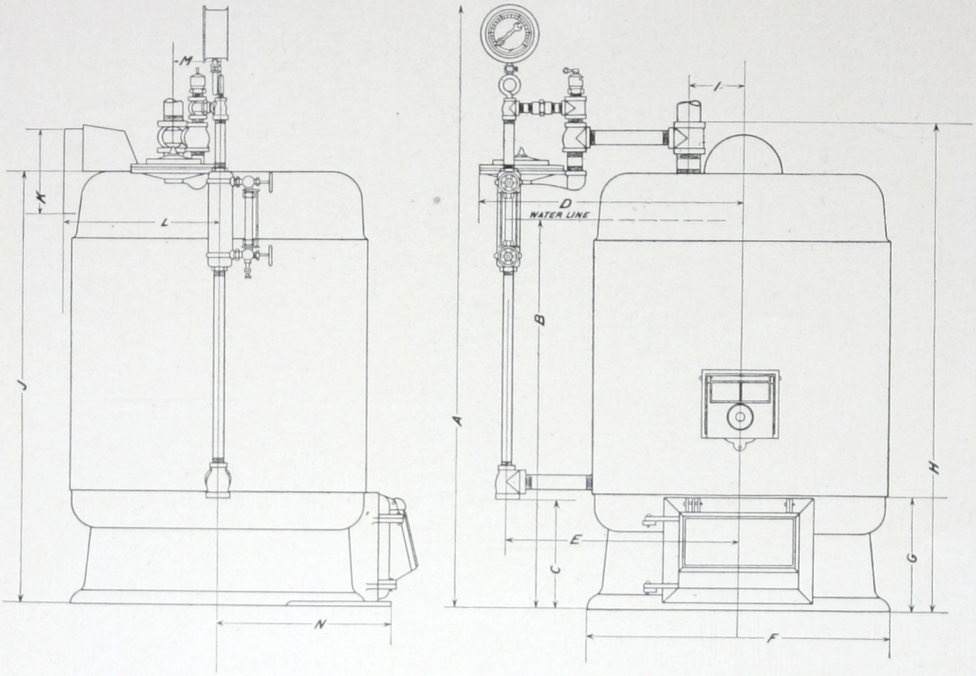


No.	A	B	C	D	E
1	30	29	17½	16¼	15½
2	33¼	32¼	19	20¾	17
3	36¼	35¼	21½	23½	19½
4	41	40	23½	29	21½

Dimensions for Vertical Heaters

No.	1	2	3	4
A	60	67	68½	71
B	40	41	42⅛	45
C	10½	10¾	10½	10
D	31	27⅞	29	33½
E	7¼	8¾	7¼	7⅝
F	30	33	36¼	41
G	12½	12½	12½	12½
H	52⅝	53⅞	55	57⅞
I	3⅛	5⅜	8¾	8¼
J	47	48⅛	50	52⅝
K	8	9	10	11
L	15½	17½	18⅛	21
M	6⅛	4⅜	3¾	3¾
N	17½	19	21½	23½

½ of F in No. 3 and No. 4 is width of sections of boiler.



Vertical Heaters

Our Guarantee

These boilers are guaranteed only to the extent of furnishing new parts for any found defective in manufacture. They are conservatively rated according to the existing standards, but on account of the varying conditions which surround their installation, we cannot guarantee our boilers except as above.